much as a square inch of foundation is laid for the astrological superstructure. It is true that Sirius is a "baleful star"; but it is in the sense of being a harbinger of hot weather. Possibly, or probably, it is regarded as a concomitant cause, no less than as a sign of the August droughts; indeed the *post hoc* and the *propter hoc* were, in those ages, not easily separable; the effect, however, in any case, was purely physical, and so unfit to become the starting-point of a superstition.

The Homeric names of the stars, too, betray common reminiscences rather than foreign intercourse. They are all either native, or naturalised on Greek soil. The transplanted fable of Orion has taken root and flourished there. The cosmopolitan Bear is known by her familiar Greek name. Boötes is a Greek husbandman, variously identified with Arkas, son of Callisto, or with Ikaros, the luckless mandatory of Dionysos. The Pleiades and the Hyades are intelligibly designated in Greek. The former word is usually derived from *pleîn*, to sail; the heliacal rising of the "tangled" stars in the middle of May having served, from the time of Hesiod, to mark the opening of the season safe for navigation, and their cosmical setting, at the end of October, its close. But this etymology was most likely an after-thought. Long before rules for navigating the Ægean came to be formulated, the "sailing-stars" must have been designated by name amongst the Achaian tribes. Besides, Homer is ignorant of any such association. Now in Arabic the Pleiades are called *Eth Thuraiyâ*, from *therwa*, copious, abundant. The meaning conveyed is that of many gathered into a small space; and it is quite similar to that of the Biblical *kîmah*, a near connexion of the Assyrian *kimtu*, family (R. Brown, "Phainomena of Aratus," p. 9; Delitzsch, "The Hebrew Language," p. 69). Analogy, then, almost irresistibly points to the interpretation of Pleiades by the Greek *pleîones*, many, or *pleîos*, full; giving to the term, in either case, the obvious signification of a "cluster."

Of the Hyades, similarly, the "rainy" association seems somewhat far-fetched. They rise and set respectively about four days later than the Pleiades; so that, as prognostics of the seasons, it would be difficult to draw a permanent distinction between the two groups; yet one was traditionally held to bring fair, the other foul weather. There can be little doubt that an etymological confusion lay at the bottom of this inconsistency. "To rain," in Greek is *huein*; but *hus* (cognate with "sow") means a "pig." Moreover, in old Latin, the Hyades were called *Suculæ* ("little pigs"); although the misapprehension which he supposed to be betrayed by the term was rebuked by Cicero (*De Nat. Deorum*, lib. ii. cap. 43). Possibly the misapprehension was the other way. It is quite likely that "Suculæ" preserved the original meaning of "Hyades," and that the pluvious derivation was invented at a later time, when the conception of the seven stars in the head of the Bull as a "litter of pigs" had come to appear incongruous and inelegant. It has, nevertheless, just that character of *naïveté* which stamps it as authentic. Witness the popular names of the sister-group—the widely-diffused "hen and chickens," Sancho Panza's "las siete cabrillas," met and discoursed with during his famous aërial voyage on the back of Clavileño, the Sicilian "seven dovelets,"—all designating the Pleiades. Still more to the purpose is the Anglo-Saxon "boar-throng," which, by a haphazard identification, has been translated as Orion, but which Grimm, on better grounds, suggests may really apply to the Hyades (*Teutonic Mythology*, trans. by J. S. Stallybrass, vol. ii. p. 729). It is scarcely credible that any other constellation can be indicated by a term so manifestly reproducing the "Suculæ" of Latin and Sabine husbandmen.

The Homeric scheme of the heavens, then, (such as it is), was produced at home. No stellar lore had as yet been imported from abroad. An original community of ideas is just traceable in the names of some of the stars; that is all. The epoch of instruction by more learned neighbours was still to come. The Signs of the Zodiac were certainly unknown to Homer, yet their shining array had been marshalled from the banks of the Euphrates at least 2000 years before the commencement of the Christian era. Their introduction into Greece is attributed to Cleostratus of Tenedos, near, or shortly after, the end of the sixth century B.C. By that time, too, acquaintance had been made with the "Phœnician" constellation of the Lesser Bear, and with the wanderings of the planets. Astronomical communications, in fact, began to pour into Hellas from Egypt, Babylonia, and Phœnicia about the seventh century B.C. Now, if there were any reasonable doubt that "blind Melesigenes" lived at a period anterior to this, it would be removed by the consideration of what he lets fall about the heavenly bodies. For, though he might have ignored formal astronomy, he could not have remained unconscious of such striking and popular facts as the identity of Hesperus and Phosphorus, the Sidonian pilots' direction of their course by the "Cynosure," or the mapping-out of the sun's path among the stars by a series of luminous figures of beasts and men.

Thus the hypothesis of a late origin for the "Iliad" and "Odyssey" is negatived by the astronomical ignorance betrayed in them. It has, however, gradations; whence some hints as to the relative age of the two epics may be derived. The differences between them in this respect are, it is true, small, and they both stand approximately on the same astronomical level with the poems of Hesiod. Yet an attentive study of what they have to tell us about the stars affords some grounds for placing the "Iliad" the "Odyssey," and the "Works and Days" in a descending series as to time.

In the first place, the division of the month into three periods of ten days each is unknown in the "Iliad," is barely hinted at in the "Odyssey," but is brought into detailed notice in the Hesiodic calendar. Further, the "turning-points of the sun" are unmentioned in the "Iliad," but serve in the "Odyssey," by their position on the horizon, to indicate direction; while the winter solstice figures as a well-marked epoch in the "Works and Days." Hesiod, moreover, designates the dog-star (not expressly mentioned in the "Odyssey") by a name of which the author of the "Iliad" was certainly ignorant. Besides which an additional constellation (Boötes) to those named in the "Iliad" appears in the "Odyssey" and the "Works and Days"; while the title "Hyperion," applied substantively to the sun in the "Odyssey," is used only adjectivally in the "Iliad." Finally, stellar mythology begins with Hesiod; Homer (whether the Ionian or the Ithacan) takes the names of the stars as he finds them, without seeking to connect them with any sublunary occurrences.

To be sure, differences of place and purpose might account for some of these discrepancies, yet their cumulative effect in fixing relative epochs is considerable; and, even apart from chronology, it is something to look towards the skies with the "most high poet," and to retrace, with the aid of our own better knowledge, the simple meanings their glorious aspect held for him.

A. M. CLERKE

ON ICE AND BRINES[1]

I.

THE composition of the ice produced in saline solutions, and more particularly in sea-water, has frequently been the object of investigation and of dispute. It might be thought that to a question of whether ice so formed does or does not contain salt, experiment would at once give a decisive answer. Yet, relying on experiment alone, competent authorities have given contradictory answers. All agree that ice, whether formed artificially in the laboratory by freezing sea-water, or found in nature as one of the various species of sea-water ice, retains, in one form or another, and with great tenacity, the salt existing in solution in the water. The question at issue is whether this salt is to be attributed to the solid matter of the ice or to the liquor mechanically adhering to it, from which it is impossible to free it. Most bodies, and especially those which take a crystalline form, are easily purified and freed from all suspected foreign matter, with a view to analysis, by the simple operation of washing and drying. It is impossible to wash the crystals, formed by freezing a saline solution, with distilled water, because they melt at a temperature below that at which distilled water freezes. The effect of the addition of a small quantity of distilled water to a quantity of saline ice is at first the anomalous one, that what was a wet sludge is transformed into a dry crystalline powder. It is of course impossible to dry the ice by heat, and to do so by more intense freezing would be begging the question. The experimental difficulties therefore account for some of the divergence of opinion on the subject. The mixed character of the substances examined has also much to do with it. As a rule it may be said that those investigators who have confined their observations to the laboratory have concluded that the ice forming when saline solutions of moderate concentration, including sea-water, are frozen, is pure ice, and the salt from which it is impossible to free it entirely belongs to the mother-liquor, while those who have collected and examined sea-water ice in high latitudes have come to the opposite conclusion.

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[1] Paper read before the Royal Society of Edinburgh, by J. Y. Buchanan on March 27 last.

During the Antarctic cruise of the *Challenger* I made a number of observations on the sea-water ice found in those regions, and relying principally on the fact that the melting temperature of the ice was markedly lower than that of fresh-water ice, and that it was impossible by any of the ordinary means familiar to chemists for freeing crystals from adhering mother-liquor to materially reduce its salinity, I came to the conclusion that the ice forming in freezing sea-water is not a mixture of pure ice and brine, but that it contains the salt found in it in the solid state either as a crystalline hydrate or as the anhydrous salt, but most probably as a hydrate. In dealing with this subject, Dr. Otto Pettersson ("Water and Ice," p. 302) quotes my observations, and also rejects the view that "sea-ice is in itself wholly destitute of salts, and only mechanically incloses a certain quantity of unfrozen and concentrated sea-water." He founds his belief on the fact that numerous analyses of specimens of sea-water ice have shown that the constitution of the saline contents of different specimens of ice differs for each specimen, and is always different from that of the saline contents of sea-water. Were the salinity due to inclosed unfrozen and concentrated sea-water, we "ought to find by chemical analysis exactly the same proportion between Cl, MgO, CaO, SO_3, &c., in the ice and in the brine as in the sea-water itself." He adduces numerous examples of analyses of specimens of sea-water ice from the Baltic and from the Arctic Seas to show that this is not the case. Calling the percentage of chlorine in each case 100, he found in various sea-waters the percentage of SO_3 vary from 11 49 to 11·89. In specimens of sea-water ice it varied from 12·8 to 76·6, and in brines separating from the ice and remaining liquid at – 30° C. it varied from 1·14 to 1·16.

This argument appears conclusive. In order to explain all the phenomena observed in connexion with sea-water ice he cites Guthrie's investigations, which went to show that, in freezing saline solutions, under a certain concentration, pure ice is formed at a temperature which falls from 0° C., when the amount of salt dissolved is infinitely small, to a certain definite temperature when the solution contains a certain definite percentage of salt. Further abstraction of heat then produces solidification of the solution as a whole, in the form of a crystalline hydrate, of constant freezing- and melting-point. To such hydrates, Guthrie gave the name of cryohydrates. Pettersson quotes the following as being particularly applicable to the case of sea-water :—

The cryohydrate of		Contains per cent. of water		Solidifies at ° C.
NaCl	...	76·39	...	– 22
KCl	...	80·00	...	– 11·4
$CaCl_2$	...	72·00	...	– 37·0
$MgSO_4$	...	78·14	...	– 5·0
Na_2SO_4	...	95·45	...	– 0·7

And he refers more particularly to the cryohydrate of Na_2SO_4 forming and melting at – 0°·7.

Now the bearing of Guthrie's experiments is to show that, while at sufficiently low temperatures, and with suitable concentration, the water will solidify along with one or other of the salts in solution, until this low temperature and high concentration are attained, pure ice must be the result of freezing.

The abnormal phenomena attending the formation and the melting of ice in saline solutions and sea-water, find a natural explanation in an observation which I have frequently quoted, and which Dr. Pettersson mentions in a footnote at p. 318, namely, that "a thermometer immersed in a mixture of snow and sea-water which is constantly stirred indicates – 1°·8 C." If this is true, it is clear that my melting-point observations proved nothing. On repeating the experiment I found it confirmed, and took the opportunity this winter of investigating the matter more closely. The paper read before the Royal Society of Edinburgh contains the first portion of the results. It deals with the subject under two heads, namely, (*a*) the temperature at which sea-water and some other saline solutions freeze, and the chemical constitution of the solid and the liquid into which they are split by freezing ; and (*b*) the temperature at which pure ice melts in sea-water and in a number of saline solutions of different strengths.

(*a*) The freezing experiments were limited to sea-water and solutions of NaCl comparable with sea-water.

Chloride of Sodium.—Four solutions were used, and they were intended to contain 3, 2·5, 2, and 1·5 per cent. NaCl respectively. Forty grammes of this solution, in a suitable beaker, were immersed in a freezing mixture of such composition as to give a temperature from 2° to 2°·5 C. below the freezing temperature expected. The temperature at which ice began to form (if necessary after adding a minute splinter of ice) was noted, and the freezing was allowed to continue with constant stirring till the temperature had fallen 0°·2 C. A specimen of the mother-liquor was removed, and the chlorine in it determined ; the chlorine in the original solution had been determined before. The beaker was then removed from the freezing bath and allowed to melt. The temperature in all cases rose during melting exactly as it had fallen during freezing. In the following table are given the means of the temperature at which ice began to form in the original solution, and that of the liquid when the sample of brine was taken, and the means of the chlorine found in the original solution and in the brine sample

Mean Freezing Temp.	– 1°·875 C.	– 1°·63	– 1°·30	– 0°·975
Mean per cent. Cl.	1·87	1·60	1·30	0·98

It will be seen that, in the dilute solutions experimented with, the percentage of chlorine expresses, in terms of the Centigrade scale, the lowering of the freezing-point of the solution.

Sea-Water.—Similar experiments were made with sea-water of different degrees of concentration. In sea-water from the Firth of Clyde containing 1·84 per cent. of chlorine, ice forms at −1°·9 C. The following results are from means of closely-agreeing results:—

Freezing temperature	−2°·0	−1°·5	−1°·0	−0°·5
Per cent. chlorine	1·94	1·445	0·963	0·475
Difference	0·06	0·055	0·037	0·025

Sea-water resembles a chloride of sodium solution, containing the same percentage of chlorine, and the resemblance is closer the greater the dilution. When the beaker was removed from the freezing-bath, the temperature rose during melting as it had fallen during freezing. In these experiments, which had for their object the determination of the temperature at which the crystals melted, as well as that at which they began to form in the water, it was impossible to remove a sample for analysis large enough to enable the sulphuric acid to be determined in it.

For this purpose a series of observations were made, using quantities of 300 grammes of sea-water. Freezing was continued usually until the temperature had fallen 0°·3 C. below that at which crystals began to form. The mother-liquor was then separated from the crystals by means of a large pipette with fine orifice, before removing the beaker from the freezing bath. The magma of crystals was then brought rapidly on a filter and drained by means of the jet pump. The ice, thus drained, was then melted, and the three fractions were analysed. In the following table (I.) the results of four experiments are given. In the one column (W) will be found the weight of the original water taken and of the fractions into which it was split in freezing; in the other (R) will be found the ratio of SO_3 to Cl found by analysis, the chlorine being set down as 100; thus, in I, the percentage of chlorine found in the crystals, melting at the lowest temperature, was 1·497, and that of the SO_3, 0·174; the ratio (R) is therefore 11·62.

TABLE I.—*Freezing sea-water—Analyses of fractions.*

No. of Experiment.	I.		II.		III.		IV.	
Nature of Water...	Forth 100 %.		Mother liquor		Clyde 100 %.		Clyde 50 %.	
	W.	R.	W.	R.	W.	R.	W.	R.
Original water	300	11·83	90	11·67	300	11·58	300	11·21
Mother-liquor	170·6	11·67	—	11·83	102	11·57	78	11·67
Drainings			—	—	94	11·56	109	—
Crystals	106	11·62	23	11·22	97	11·67	106	11·44
"	22·5	11·11	—	—	—	—	—	—

It will be seen that the ratios (R) found for mother-liquor, drainings, and ice agree with one another quite as closely as those found in samples of pure sea-water from different localities. It is to be remembered that in these experiments the water was frozen *gently*, that is, the rate of abstraction of heat was low, the temperature of the freezing bath being regulated so as to be about 2° C. below the freezing temperature of the solution. Much of the error and uncertainty about the freezing of saline solutions arises from the violence of the methods employed. Judging then by the constancy of the relation of the percentage of Cl to SO_3 we see that in sea-water, frozen at moderate temperatures, the composition of the saline contents of the original water, the mother-liquor and the ice is identical; and we are justified in concluding that it is probable that the saltness of the ice is due to unfrozen and concentrated sea-water adhering to it. Ice forming in even very weak saline solutions closely resembles snow (which is ice forming in air), and has the same remarkable power of retaining mechanically several times its weight of water or brine.

A strict account was kept of the heat removed from the sea-water while the freezing was going on. In Table II. will be found the number of heat-units (gramme ° C.) removed during the freezing in the case of Nos. III. and IV.; and this number, divided by 79·25, gives the weight of pure ice, which could have been formed at 0° C. by the removal of heat.

TABLE II.—*Calculation of ice formed.*

			III.	IV.
Weight of original water (grammes)		W	300	300
Per cent. Cl in ditto		c	1·836	0·923
Per cent. Cl in mother-liquor		K	2·212	1·153
Weight of mother-liquor	$W\frac{c}{K}=$	L	249·0	239·3
Weight of ice	$W-L=$	I	51·0	60·7
Mean freezing temperature (° C).....................		...	−2°.05	−1°·05
Heat abstracted (grammes ° C)		...	4230	5193
Equivalent ice formed (grammes)		...	53·4	65·5

Sea-water, like other saline solutions, is easily cooled several degrees below its freezing-point before crystals begin to form. While cooling down to and below what was known to be its freezing-point, simultaneous observations of the temperature of the sea-water and the freezing bath were made from half-minute to half-minute. From these observations, the rate of abstraction of heat for different differences of temperature of sea-water and bath was found. At a given moment a minute splinter of ice (weighing much less than a drop of water) was introduced. Crystals immediately began to form, and the temperature rose in from ten to fifteen seconds to the freezing-point. During the freezing the temperatures of bath and sea-water were observed at regular intervals. The heat removed is thus made up of that eliminated during the few seconds when freezing began and the temperature rose to the freezing-point, which is found by multiplying the rise of temperature by the weight of liquid, and that removed during the subsequent cooling, which is deduced from the duration of the operation and the rate of loss of heat observed before freezing commenced. The specific heat of the solution is taken as unity. In the table are further given the weight of the sea-water used, the percentage of chlorine in the original water and in the mother-liquor, the weight of the mother-liquor on the assumption that it contains all the salt of the original water, and, by difference, the weight of the ice formed. The agreement between the two quantities of ice formed as calculated by the different methods is as close as could be expected.

It has thus been shown that the composition of the saline contents of the ice formed as above described is the same as that of the original water, and this of itself is almost conclusive that the salt is contained in adhering brine and not as a solid constituent of the ice. Assuming that this is so the amount of ice formed as deduced from the composition of the mother-liquor agrees well with the amount deduced from the thermal exchange taking place during the freezing.

It has, moreover, been proved by Guthrie, Rüdorff, and others, that, in solutions of the salts occurring in sea-water, ice does separate out at first, and continues to separate out until the concentration has become many times greater than that of sea-water. Assuming that in sea-water all the chlorine is united to sodium, 87 per cent. of the water would have to be removed as ice before a cryohydrate would form, and if it contained nothing but sulphate of soda in the proportion corresponding to the sulphuric acid formed in it, over 90 per cent. of the water would have to go as ice, before the cryohydrate would be formed.

In my experiments, about 15 per cent. of the weight of the water was frozen out as ice, causing a lowering of freezing-point by 0°·3 C. In nature it is probable that the ice forming at the actual freezing surface does so at an almost uniform temperature, the local concentration produced by the formation of a crystal of ice being immediately eliminated by the mass of water below. In the interstices of the crystals there will be retained a weight of slightly concentrated sea-water at least as great as that of the ice crystals. These retain the brine in a meshwork of cells, and, as the thickness of the ice covering increases, and the freezing surface becomes more remote, the ice and the brine become more and more exposed to the atmospheric rigours of the Arctic winter. The brine will continue to deposit ice until its concentration is such that, for example, the cryohydrate of NaCl is ready to separate out. It probably will separate out until it comes in conflict with, for instance, the chloride of calcium or the chloride of magnesium, which will retain some of the water, without solidifying, even at the lowest temperatures. At the winter quarters of the *Vega* brine was observed oozing out of sea-water ice and liquid at a temperature of – 30° C. It was very rich in calcium and especially magnesium chlorides. In fact, *it is probably quite impossible by any cold occurring in nature to solidify sea-water.*

The residual and unfreezable brine which remains in considerable quantity liquid when sea-water is frozen, must also remain in greater or less quantity when fresh water is frozen. All natural waters, including rain-water, contain some foreign and usually saline ingredients. If we take chloride of sodium as the type of such ingredients, and suppose a water to contain a quantity of this salt equivalent to one part by weight of chlorine in a million parts of water, then we should have a solution containing 0·0001 per cent. of chlorine, and it would begin to freeze and to deposit pure ice at a temperature of – 0°·0001 C.; and it would continue to do so until, say, 999,000 parts of water had been deposited as ice. There would then remain 1000 parts of residual water, which would retain the salt, and would contain, therefore, 0·1 per cent. of chlorine, and would not freeze until the temperature had fallen to – 0°·1 C. This water would then deposit ice at temperatures becoming progressively lower, until, when 900 more parts of ice had been deposited, we should have 100 parts residual water, or brine as it might now be called, containing 1 per cent. of chlorine, and remaining liquid at temperatures above – 1°·0 C. When 90 more parts of ice had been deposited, we should have 10 parts of concentrated brine containing 10 per cent. of chlorine and remaining liquid at – 10° C. In the case imagined, we assume the saline contents to consist of NaCl only, and with further concentration the cryohydrate would no doubt separate out and the mass become really solid. On reversing the operations, that is, warming the ice just formed, we should, when the temperature had risen to – 10° C., have 999,990 parts ice and 10 brine containing 10 per cent. chlorine. Now, owing to the remarkable fact (which is dealt with at length in the second part of the paper) that pure ice, in contact with a saline solution, melts at a temperature which depends on the nature and the amount of the salt in the solution, and is identical with the temperature at which ice separates from a solution of the same composition on cooling, the brine liquefies more and more ice at progressively rising temperatures, until, as before, when the temperature of the mass has risen to – 0°·1 C., it consists of 999,000 parts of ice and 1000 parts of liquid water, containing 1 part of chlorine. The remainder of the ice will melt at a temperature gradually rising from – 0°·1 C. to 0° C.

The consideration of this example furnishes an easy explanation of the anomalous behaviour of ice, formed from anything but the very purest distilled water, in the neighbourhood of its melting-point. This subject has been studied with great care and thoroughness by Pettersson. The apparent expansion of all but the very purest ice, when cooled below 0° C., is ascribed by him in part to solid saline contents of the ice which exercise a disturbing and unexplained influence on its physical properties. Viewed in the light of the fact that the presence of even the smallest quantity of saline matter in solution prevents the formation of ice at 0° C. and promotes its liquefaction at temperatures below 0° C., we see that this apparent expansion of the ice on cooling is probably due to the fact that we are dealing not with homogeneous solid ice but with a mixture of ice and saline solution. As the temperature falls this solution deposits more and more ice and its volume increases. But the increase of volume is due to the formation of ice out of water and not to the expansion of a crystalline solid already formed.

In Table III. are given the volumes occupied by the ice (with inclosed brine) formed by freezing 100,000 c.c. (at 0° C.) of a water containing chloride of sodium equivalent to 7 grammes chlorine in 1,000,000 cubic centimetres (at 0° C.).

TABLE III.—*Water containing 7 parts Cl in* 1,000,000.

Temp. ° C.	Water frozen. c.c.	Ice formed. c.c.	Brine remaining. c.c.	Ice and Brine. c.c.	Pettersson III. Vol. of ice at T. c.c.	Diff.
T	V_1	v_1	V_2	v_2	P	$P - v_2$
– 0·07	99000	107979	1000	108979	108980	1
– 0·10	99300	108306	700	109006	109007	1
– 0·15	99533	108561	467	109028	109038	10
– 0·20	99650	108687	350	109037	109048	11
– 0·40	99825	108879	175	109054	109057	3

The volume of the ice formed on freezing this water is compared with that observed by Pettersson in freezing a sample of the distilled water in ordinary use in the laboratory.

It will be seen that the volumes observed by Pettersson agree very closely with those calculated for a water containing 7 parts of chlorine in a million.

The irregularities in the melting-points of bodies like acetic acid, to which Pettersson refers, are without doubt due to a perfectly similar cause.

Also the very low latent heat observed by Pettersson for sea-water is to be explained by the fact that the salt retains a considerable proportion of the water in the liquid state even at temperatures many degrees below the freezing-point of distilled water.

The *plasticity* of ice and the motion of glaciers receive a simple and natural explanation when we see, as in Table III., that, if the water from which this ice is produced contains no more than 7 parts of chlorine per million, it will, in the process of thawing, when the temperature has risen to – 0°·07 C., consist to the extent of 1 per cent of its mass of liquid brine or water. The water considered in Table III. is certainly not less free from foreign ingredients than rain or snow. It follows, therefore, that a glacier, in a climate where the temperature is for the greater part of the year above 0° C., must have a tendency to *flow*, owing to the power of saline solutions to deposit ice and to dissolve it at temperatures below 0° C.

(*To be continued.*)

NOTES

THE Endowed Schools Committee, of which Sir Lyon Playfair is Chairman, after sitting for a year and a half, have agreed to their Report. This is not yet issued, but it is known that the Committee have reported in favour of endowed schools being in future largely used for the promotion of scientific and technical education. The Report also recommends that local authorities should be authorised to employ local rates for founding or contributing to laboratories and workshops in such schools in order to promote practical scientific education.

LAST week an important Conference was held at Oxford for the consideration of questions connected with the University Extension Scheme. The meetings were attended by many members of the University, local delegates, and others interested in